

REMARKS

Reconsideration of this application is respectfully requested in view of the foregoing amendment and the following remarks.

Claims 52-65, 68, and 73-93 were pending in this application. In this Amendment, Applicants have amended claims 52, 73, 74, 76, 77, 81, 82, 83, 88, and 89, and have canceled claims 63-65 without prejudice to or disclaimer of the subject matter thereof. Applicants have also added new claims 94 and 95. Accordingly, claims 52-62, 68, and 73-95 will be pending upon entry of this Amendment.

In the Office Action mailed February 28, 2006, the Examiner objected to the claims as introducing new matter into the disclosure and rejected claims 52-62, 68 and 73-93 under 35 U.S.C. § 112, ¶ 1, as failing to comply with the written description requirement. In this same vein, the Examiner also objected to the drawings for failing to show every feature of the invention specified in the claims.

In the Office Action, the Examiner also rejected claims 52, 54-65, 68 and 73-93 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent Application Publication No. 2002/0055282 to Eldridge et al. ("Eldridge"). The Examiner also rejected claim 53 under 35 U.S.C. § 103(a) as being unpatentable over Eldridge in view of Applicants' Admitted Prior Art (AAPA).

Applicants address each of the objections and rejections under the corresponding subheadings below.

Objections to Drawings

The Examiner objected to the drawings as not showing the claimed feature “surface of the substrate exposing an exposed portion of the embedded electrical circuit...a contact element formed on...the exposed portion.” Applicants respectfully submit, however, that this recited feature is shown in the pending drawings, specifically in Figures 9A-9H. These figures show an embedded electrical circuit 145 in substrate 142, with a top metal portion 147 of the circuit 145 exposed at the surface of the substrate 142. The top metal portion 147 comprises the recited exposed portion of the claims. The specification makes this feature clear in describing at, for example, lines 7-10 of ¶ [0073], the top metal portion 147 as formed on the top surface of substrate 142 to be connected to the contact element to be formed thereon. Regarding the Examiner's specific objection to claim 83, Applicants respectfully submit that Figures 9A-9H do show two exposed top metal portions 147, thereby depicting the recited second exposed portion of claim 83. And, when Figures 9A-9H are viewed with reference to the specification at, for example, lines 4-5 of ¶ [0076], it is clear that the first and second exposed portions can be connected to the same embedded circuit.

Regarding the Examiner's objections to claims 63 and 65, those claims have been canceled, thereby rendering the objections moot.

Applicants therefore respectfully submit that every claimed feature is adequately shown in the drawings and that neither the claims nor the drawings require amending. Applicants respectfully request withdrawal of these objections.

Claim Objections

The Examiner objected to the claims as introducing new matter related to the surface of the substrate exposing a first and second portion of the embedded electrical circuit. For the same reasons stated above for the drawing objections, Applicants respectfully submit that the specification and figures do fully support these features, and that accordingly the claim amendments entered in the November 2, 2005 Amendment did not introduce new matter. The top metal portion 147 of embedded circuit 145 is exposed on the surface of substrate 142, as shown in Figures 9A-9H and described in the corresponding portions of the specification. Applicants therefore respectfully request withdrawal of these claim objections.

35 U.S.C. § 112, ¶ 1: Claims 52-62, 68, and 73-93

Related to the drawing and claim objections, the Examiner rejected claims 52-62, 68, and 73-93 under 35 U.S.C. § 112, ¶ 1, for lacking an adequate written description of the subject matter “a surface of the substrate exposing an exposed portion of the embedded electrical circuit...a contact element formed on...the exposed portion.” However, for the reasons stated above, Applicants respectfully submit that this subject matter is fully supported by Applicants’ original disclosure and request withdrawal of this rejection.

35 U.S.C. §§ 102 and 103: Claims 52-62, 68, and 73-93

The Examiner rejected claims 52, 54-62, 68, and 73-93 as anticipated by Eldridge, and rejected claim 53 as obvious over Eldridge in view of Applicants’ Admitted Prior Art. To the

extent these rejections might still apply to the claims presently pending, Applicants respectfully traverse the rejections as set forth below.

Applicants have amended independent claims 52 and 74 to clarify a feature of the present invention that is distinguishable over Eldridge. Specifically, Applicants have amended claims 52 and 74 to recite that the base portion of the contact element is adhered to the substrate by a conductive adhesion layer, and that the conductive adhesion layer is adhered to the exposed portion of the embedded electrical circuit and extends along the substrate underneath and apart from the spring portion of the contact element. In contrast to this feature, Eldridge teaches a seed layer formed only between the base 908 of the contact structure 900 and the substrate 930. (*See, e.g.*, Figure 9H of Eldridge and the corresponding detailed description.)

As disclosed in the present specification at lines 3-4 of paragraph [0017], and in the Abstract at lines 2-3, the present invention generally includes a substrate and an array of contact elements of conductive material formed on the substrate. One aspect of forming the contact elements involves applying a conductive adhesion layer to the substrate, as is disclosed in the application, for example, at ¶¶ [0019]-[0020] and [0097]-[0104] of the specification and in Figures 15A-15H. In addition, another aspect of forming the contact elements on a substrate involves forming the contact elements on a substrate having predefined circuitry and exposed top metal portions of that circuitry formed on the top surface of the substrate, as is disclosed in the application, for example, at ¶¶ [0073]-[0077] of the specification and in Figures 9A-9H. Thus, the present application supports a configuration in which a conductive adhesion layer (such as

that shown in Figures 15A-15H) is applied to a substrate having predefined circuitry (such as that shown in Figures 9A-9H).

The conductive adhesion layer 103 of the present invention effectively provides an extended base portion of a contact element, to improve the adhesion of the contact element to the substrate. As shown in Figure 15A and described at ¶ [0098], the conductive adhesion layer 103 is deposited on the substrate 102. The support layer 104 is applied on top of the conductive adhesion layer 103 and a mask layer 106 is formed on the top surface of the support layer 104. After printing and developing the mask layer 106, the portions of the support layer 104 not covered by the mask pattern are etched away and the mask layer 106 is removed, leaving support regions 104A-C formed on the conductive adhesion layer 103 (Figure 15D). The support regions 104A-C are then shaped by etching (Figure 15E) and a metal layer 108 is formed on the conductive adhesion layer 103 and on the support regions 104A-C. After depositing mask layers 110A-C over the metal layer 108 (Figure 15F), the portions of the metal layer 108 and conductive adhesion layer 103 that are not covered by mask layers 110A-C are removed by etching. The mask layers 110A-C are then removed, thereby leaving metal portions 108A-C and conductive adhesion portions 103A-C (Figure 15G). The support regions 104A-C are then removed to leave free standing contact elements 112A-C formed on respective conductive adhesion portions 103A-C (Figure 15H).

As described in the specification at, for example, ¶ [0104], each conductive adhesion portion serves to extend the surface area of the base portion of the contact elements 112A-C to provide more surface area for attaching the contact element to substrate 102. This configuration

improves the adhesion of the contact elements to the substrate and, in so doing, improves the reliability of the contact elements.

In contrast to this feature, Eldridge discloses contact structures 900 attached to the substrate 930 by only a base 908. There is no conductive adhesion layer that extends underneath and apart from the spring portion of the contact. Indeed, by applying the molded sacrificial layer 950 directly to the substrate 930 and depositing the seed layer 966 over the sacrificial layer 950, Eldridge teaches away from any layer – let alone a conductive adhesion layer – extending underneath and apart from the beam 910. Thus, Eldridge fails to teach or suggest this feature of the present invention.

Accordingly, Applicants respectfully submit that claims 52 and 74 are distinguishable over the prior art of record. In addition, Applicants respectfully submit that dependent claims 53-62, 68, 73, and 75-93 are also patentable due at least to their dependence on an allowable base claim.

Applicants have also amended claims 73, 76, 77, 81, 82, 83, 88, and 89 to be consistent with amended claims 52 and 74. Applicants have also amended claims 52, 74, 82, 83, 88, and 89 to recite metal film deposition, support for which can be found in the present specification at, for example, paragraph [0102].

Applicants have also added new claims 94 and 95, which also depend from amended independent claims 52 and 74, respectively. Support for these new claims can be found in the specification at, for example, ¶ [0098]. Applicants respectfully submit that new claims 94 and 95 are also patentable due at least to their dependence on an allowable base claim.

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Conclusion

In view of the foregoing, all of the claims in this case are believed to be in condition for allowance. Should the Examiner have any questions or determine that any further action is desirable to place this application in even better condition for issue, the Examiner is encouraged to telephone Applicants' undersigned representative at the number listed below.

Respectfully submitted,

DIRK D. BROWN ET AL.


By their Representatives,

CUSTOMER NUMBER: 58817

703/770-7900

Date: August 28, 2006

By:

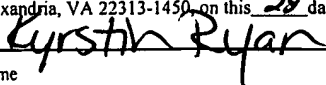
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